Educate to Empower

Attention, Class lesson pack



Teacher background notes

The evidence behind each part of the two lessons

Ages 11–18

Concentration: how to take action on distraction

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These notes are for you

You can teach both lessons from the slides and the presenter notes alone, and nothing here is required reading. But if you have fifteen minutes before you teach, this is the best place to spend them. After the slides, it is the most useful resource in the pack.

Each section sets out, in plain language and with sources, the research behind one part of the lessons, and names the slides it supports. Teachers ask the same questions that students do — is it true that attention spans are shrinking, do phone bans work, why do some people work better with noise — and the answers are here. Most of it also applies well beyond these two lessons: to how a room is set up, to when in the day demanding work is set, and to how you respond to a student who is too switched-on or too switched-off.

If you only have a few minutes, read sections 1 and 3 before Lesson 1, and the table of common misconceptions near the end. The notes also show colleagues where every claim in the lessons comes from.

These notes have been prepared by Prof Sam Wass, author of the book Take Action on Distraction, published by Bloomsbury Education.

Section	Supports	What it offers you as a teacher
1. Two kinds of attention	Lesson 1 · slides 8, 13 and 16	Why some things in a classroom cannot be ignored, however hard a student tries
1b. The counting video	Lesson 1 · slide 14	Why full attention on one thing means missing another, and how to debrief the video
2. Mind-wandering	Lesson 1 · slide 17	How often minds wander in lessons, and why short tests during a lesson reduce it
3. Arousal and the Goldilocks zone	Lesson 1 · slides 19–26	Why the two ways concentration goes wrong need opposite responses, and why the switched-off student is the one who gets missed
4. Stress and attentional control	Lesson 2 · slide 45	What a period of high pressure does to attention, and the evidence that it recovers

Section	Supports	What it offers you as a teacher
5. Sleep and body clocks	Lesson 2 · slide 44	Why early lessons are hard for teenagers, and when to set the most demanding work
6. Platform design and phone policy	Lesson 2 · slides 33–40	What the research on school phone bans does and does not show, and where each country stands
7. Noise and signal-to-noise	Lesson 2 · slides 52–53	Why chatter is worse than steady noise, and what that means for your own room
8. Movement	Lesson 2 · slide 51	Why a short movement break helps both the restless student and the flat one
9. Implementation intentions	Lesson 2 · slide 55	Why a specific “when X, I will do Y” plan works better than a general resolution, and why the revisit matters

1. Two kinds of attention

SLIDES 8, 13 and 16 · Lesson 1 · attention capture and attention control

The central distinction in the lessons — between attention that is grabbed and attention that is chosen — corresponds to a well-established division in the cognitive neuroscience literature between a stimulusdriven, "bottom-up" system and a goal-directed, "top-down" system. Corbetta and Shulman (2002) set out the anatomical case for two partially separable networks: one brain system that maintains goals and biases processing towards them, and another brain system that interrupts when something unexpected and behaviourally relevant appears.

The deck deliberately avoids the terms "bottomup" and "top-down". Students consistently misread "bottom-up" as meaning less important. "Capture" and "control" carry the meaning without the misdirection, and they map onto what students can actually notice happening.

The claim that attention capture is fast, automatic and cannot be switched-off is well supported for transitions that include abrupt onsets, looming motion, sudden sound.

1b. The counting video, and what it demonstrates

SLIDE 14 · Lesson 1 · the counting video

Slide 14 shows a short video in which the class is asked to count something and, while doing so, misses something obvious in plain view. The phenomenon is inattentional blindness: when attention is engaged by a demanding task, unattended stimuli — even large, unusual ones — frequently go unreported.

The classic demonstration is Simons and Chabris (1999), in which roughly half of observers counting basketball passes failed to report a person in a gorilla suit walking through the scene. The finding is robust and has been replicated many times, and it is the reason this activity works reliably rather than occasionally.

Two points to hold on to when you run it. First, missing the unattended event is the normal result, not a failure — the presenter note asks you to say so. Second, the effect is about attentional load rather than about looking in the wrong place: in an eye-tracking version of the task, the children who missed the unexpected figure had spent as long looking at it as those who saw it (Memmert, 2006), which is exactly the point slide 11 makes.

Do this before Lesson 1

Preview the specific video before you teach it. If the embedded video does not work then, there is a version here: https://www.youtube.com/watch?v=vJG698U2Mvo. You need to know what the class is asked to count and what they are meant to miss, so that you can debrief it properly. The link is on slide 14 and in the lesson plan. If it will not play, describe what the clip shows and move straight on — nothing later in either lesson depends on it.

2. Mind-wandering, and how often it happens

SLIDE 17 · Lesson 1 · the 30% figure, and what it means in minutes

The slide says students report their minds wandering roughly a third of the time in lessons. The presenter note turns that into minutes: about eighteen minutes in every hour, or close to a quarter of an hour in a 45-minute lesson.

Lindquist and McLean (2011) probed university students during lectures and found task-unrelated thought on roughly a third of probes, rising from about a quarter early in a lecture to over 40% by the end. Risko et al. (2012) reported about 43% overall, again rising sharply in the second half. Szpunar, Moulton, et al. (2013) collect these and related findings in a review written for educators.

What about the second half of the claim — that mindwandering costs you comprehension? Randall et al. (2014) meta-analysed the relationship between mindwandering and performance across a wide range of tasks; Bonifacci et al. (2023) meta-analysed reading comprehension specifically, finding a pooled correlation of about −0.21 across 25 studies and nearly 4,000 participants. Wammes et al. (2016) linked lecture mindwandering directly to quiz and exam performance. Szpunar, Khan, et al. (2013) showed the effect can be reduced by interpolating short tests through a lecture, which is a practical point worth knowing: the fix for mind-wandering is often structural rather than motivational.

3. Arousal, and the Goldilocks zone

SLIDES 19–26 · Lesson 1 · the inverted-U curve, too switched-on, too switched-off

The inverted-U relationship between arousal and performance originates with Yerkes and Dodson (1908), who found that the stimulus intensity producing fastest learning in mice varied with task difficulty. Aston-Jones and Cohen (2005) proposed that activity in the locus coeruleus–noradrenaline system follows an inverted-U with respect to task performance: at low tonic levels, animals are drowsy and disengaged; at intermediate levels, phasic responses to task-relevant events are largest and performance is best; at high tonic levels, behaviour becomes distractible and exploratory. This is the account the lessons are really drawing on, and it explains something the bare curve does not — why the two failure modes feel so different from the inside.

Professor Wass's own research programme bears directly on the classroom application. Wass (2018) reviews the relationship between physiological stress reactivity and cognitive performance in early childhood; Wass (2021) sets out how early development within arousal and regulatory systems shapes later attentional and affective control. Wass et al. (2019b) found that elevated physiological arousal in children was associated with larger but more variable neural responses to small acoustic changes — a finding that maps neatly onto the classroom experience of a child who is both over-reactive and inconsistent.

Why the deck says "switched-on" and "switched-off". "Arousal" is the technical term and it is unusable with this age group. The switched-on / switched-off pairing keeps the dimensional structure — one continuum, two ends — without either problem, and students reliably self-locate on it within seconds.

The under-aroused end is the one that gets missed This is worth flagging for teachers rather than students. A child who is over-aroused generates behaviour you can see. A child who is under-aroused generates nothing: no disruption, no noise, no signal at all.

Whiting et al. (2021) is the most directly teacher-facing paper in this area — a review of what the neuroscience of stress and learning actually implies for classroom practice, co-authored by Professor Wass. It is a good next read for anyone with a pastoral or special-educational-needs role.

Liston, McEwen & Casey (2009); Whiting et al. (2021).

4. Stress and attentional control

SLIDE 45 · Lesson 2 · the examperiod study

The study described on the slide is Liston, McEwen and Casey (2009). Medical students were scanned and tested after a month of intense academic stress, and again a month later, when the pressure had eased. During the stressful period, attentional control was measurably impaired and functional connectivity in prefrontal networks was disrupted. Both recovered afterwards.

Two things make this the right study for these lessons. First, the same students were measured twice and compared with a matched low-stress group, also measured twice, so the result is not confounded by the possibility that more distractible people are also more stressed. Second, and more importantly for the classroom, the effect reverses. That reversibility is what makes the slide reassuring rather than fatalistic, and the presenter note asks you to say it explicitly.

5. Sleep, body clocks and the adolescent day

SLIDE 44 · Lesson 2 · teenage body clocks run later

Carskadon (2011) sets out the "perfect storm" model: a biologically driven delay in circadian phase during puberty, a slower build-up of homeostatic sleep pressure across the waking day, and a social environment — school start times, homework, screens, part-time work — that pushes in the same direction. Crowley et al. (2018) updates the model with several more years of evidence and is the better citation if you want the current position.

The deck makes a deliberate choice not to lecture about bedtimes. The evidence on the phase delay is strong, but telling a fifteen-year-old to go to bed earlier is both unhelpful and, in part, biologically unrealistic. The actionable content is the second half: given that your good hours are where they are, and that the school day will not move, put the work that needs most concentration into the hours where you actually get things done.

A note on the body-clock graphic

The curve on slide 44 is illustrative, not a data plot. It shows the general shape most teenagers report — hard early, a post-lunch dip, a late-afternoon and early-evening peak — and the slide explicitly tells students that their own pattern is their own. Do not present it as measured data.

6. Platform design and attention

SLIDES 33–40 · Lesson 2 · Section 3

This is the section students most want, and the one where it is easiest to lose them by overclaiming. The deck is built around a specific argument that is worth understanding before you teach it.

The two-pull structure

Rather than treating platform design as one undifferentiated problem, the deck splits it along the same line as Section 1. Recommendation algorithms engage attention control: they work out what you are already interested in and offer more of it, which means the pull is genuine interest rather than manipulation. Notification badges, autoplay, streaks and infinite scroll engage attention capture: movement, sound, colour, unexpectedness, aimed at a system that does not ask permission.

The pedagogical payoff is that it explains why "just put it down" fails. Advice that assumes the pull is external and illegitimate does not match the student's own experience of wanting to keep watching. Naming the second pull as real interest buys the credibility needed for the first half of the section to land.

Phone bans: the evidence is genuinely mixed

If a student or colleague raises school phone policy, it is worth knowing that the research does not point one way, and saying so is more persuasive than picking a side.

Goodyear et al. (2025) A cross-sectional study of 30 secondary schools in England found that restrictive school phone policies were not associated with better mental wellbeing, sleep, physical activity, attainment or classroom behaviour. Overall phone and social media use across the day was associated with worse outcomes.

Böttger & Zierer (2024) A rapid review found a small overall benefit of smartphone bans (d ≈ 0.16), larger for social wellbeing (d ≈ 0.22) than for attainment (d ≈ 0.05). It rests on five studies, two of which are the Swedish and Norwegian studies below, so these four entries are not independent of each other.

Kessel et al. (2020) A study of Swedish secondary schools found no significant effect of banning phones on attainment.

Using Norwegian administrative data, **Abrahamsson (2026)** found no average effect of smartphone bans on attainment or mental health, but clear gains for girls: less use of psychological health care and better grades, especially for girls from disadvantaged backgrounds. Bullying fell for both girls and boys.

The honest summary is that whole-school phone policy is a live empirical question with defensible positions on both sides. The narrower claim, that a phone within reach takes up attention during a task, comes from experiments in which people were randomly given different places to put their phone (Ward et al., 2017). That evidence is not settled either: a direct replication did not find the effect (Ruiz Pardo & Minda, 2022), while a meta-analysis of 22 studies found an overall negative effect that varied from task to task (Böttger et al., 2023). The deck makes the second claim and not the first — deliberately — and it is best offered to students as something worth testing for themselves, not as proven.

School phone rules changed in several countries during 2025 and 2026, and they differ a great deal. Rules are still changing, so check your own school's rules and the current national or regional position before you rely on it.

7. Noise, signal-to-noise and the classroom environment

SLIDES 52–53 · Lesson 2 · Strategy 4

The signal-to-noise framing is the most directly transferable idea in the two lessons, because it is the one students can act on the same evening. The key insight — that what matters is the difference between target and background rather than the absolute level of either — comes straight from psychoacoustics, and it is why turning the signal up is as valid a move as turning the noise down.

The claim that chatter is worse than steady noise concerns informational rather than energetic masking. Speech competes with speech for the same processing resources in a way that broadband noise does not, and the competition gets worse the more similar the competing voice is to the target. Brungart and Simpson (2007) show that interference gets worse as the competing talker becomes more similar to the target. If you need the canonical demonstration of the similarity effect for a formal citation, Brungart's 2001 singleauthored paper in the same journal is the primary source.

On classroom noise specifically: Massonnié et al. (2022, Environment and Behavior) is the most relevant study for these lessons, because it links children's reported annoyance and distraction from noise to individual differences in mind-wandering and switching skills — that is, it connects the environment directly to the attentional mechanism. Gheller et al. (2023) systematically review the effects of noise on children's cognitive performance; Mercugliano et al. (2025) review classroom acoustic quality and student wellbeing across educational levels. Wass et al. (2019a) examined how environmental stressors including household noise relate to autonomic function in infancy.

8. Movement, and why it works on both problems

SLIDE 51 · Lesson 2 · Strategy 3

Movement is presented as the only strategy that works on both failure modes, because it shifts arousal towards the middle from either direction. This follows directly from the arousal account in Section 3 above rather than from a single study, and the slide is careful to frame it as a rule of thumb rather than a finding.

Most national curricula name physical activity as part of looking after health and wellbeing. This gives this strategy a curriculum hook in most countries.

9. Implementation intentions — why the exit ticket has that shape

SLIDE 55 · Lesson 2 · Activity 5

The exit ticket asks for "when X, I will do Y" rather than a general resolution, and that format is doing real work. Gollwitzer (1999) introduced implementation intentions as if–then plans that specify the situational cue as well as the response, arguing that this delegates control of the behaviour to the environment rather than requiring an act of will at the moment of action.

Gollwitzer and Sheeran (2006) meta-analysed 94 independent tests and found a medium-to-large effect on goal attainment over and above the effect of forming a goal intention alone. This is why the slide rejects "concentrate better" and insists on "phone in my bag, not on the desk, when I do my homework tonight".

The practical corollary matters more than the citation: the effect depends on the cue actually being encountered and recognised. A plan that is written once and never revisited loses most of its value. The lesson plan recommends returning to the exit tickets about two weeks after Lesson 2, and that revisit is the single change most likely to make the lessons affect behaviour.

Gollwitzer (1999); Gollwitzer & Sheeran (2006).

Common misconceptions, and how to answer them

What students (or colleagues) say	What to say back
"I can multitask fine."	What feels like multitasking is fast switching, and each switch costs something. The counting video is the demonstration: full attention on one thing means missing another thing in plain sight. Avoid turning this into an argument — the activity makes the point better than you can.
"My attention span is broken / I have the attention span of a goldfish."	The "attention spans are shrinking" claim, and the goldfish comparison in particular, has no sound evidential basis and has been repeatedly traced back to sources that do not support it. Do not repeat it. The deck's framing is better and truer: concentration is a state that varies, not a fixed quantity you have or lack.
"So it is my brain's fault, not mine."	Both halves are true. The developmental point is real and it is not an excuse. The whole of Section 5 exists because there are things you can change — most of them about the situation rather than about effort.
"Just tell them to try harder."	For a student who is already over-aroused, more effort moves them further past the top of the curve. Diagnosis has to come before the fix, which is why Strategy 1 is "notice which state you are in" and not "concentrate".

What students (or colleagues) say	What to say back
“Phones should just be banned.”	There is experimental evidence that a phone within reach takes up attention during a task (Ward et al., 2017), although it has not always replicated. The evidence on whole-school bans is mixed — see Section 6. In most of the countries where these lessons are used, restricting phones at school is now national or regional policy in any case, so the question in most schools is implementation rather than principle.
“Some people just work better with music on.”	Often true, and the deck explicitly supports it. Strategy 2 exists because different people sit at different default points on the same curve. The one qualification worth adding is that lyrics compete with reading in a way instrumental music does not — that is informational masking, the same mechanism as the chatter slide.
“Isn’t mind-wandering good for creativity?”	There is literature arguing that, and it is not silly. The deck’s claim is narrower and well supported: while you are trying to take something in, mind-wandering costs you comprehension. Both can be true.

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Background reading for the slides

These works are not cited in the notes above. They lie behind points made on the slides: what attention is (James), how slowly attention control matures through adolescence (Casey et al., Diamond, Luna et al., Petanjek et al.) and how common mind-wandering is (Killingsworth & Gilbert, Smallwood & Schooler).

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Further reading for teachers

Wass and Goldenberg (2025) is written for practitioners rather than researchers, and although it is written for teachers of younger children (the early years and the first years of primary school) the underlying account of attention, arousal and environment is the same one these lessons are built on. Whiting et al. (2021) is the most useful single journal article. It is written explicitly for teachers, although most of the research it reviews is on primary school children.